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**MARKED UP COPY OF THE ORIGINALLY FILED SPECIFICATION
FILED UNDER M.P.E.P. 608.01 (q) TO SHOW CHANGES MADE
TO OBTAIN THE SUBSTITUTE SPECIFICATION**

Hon. Commissioner of Patents
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Sir:

In response to the Office Action dated December 20, 2006 and in addition to the accompanying amendment, please accept the following marked up copy of the original specification filed under M.P.E.P. 608.01 (q), which shows the changes made to obtain the substitute specification filed in the amendment:

In the Specification:

The following marked-up copy is warranted to contain no new matter:

SUBSTITUTE SPECIFICATION

CROSS-REFERENCE

0001 This is the U.S. National Stage of PCT/JP 2004/003526, which was filed March 17, 2004 in Japan and which entered the U.S. National Stage in accordance with 35 U.S.C. 371, which, in turn, claims the benefit of priority of invention under 35 U.S.C. 119 based on JP 2003-71869, filed March 17, 2003, in Japan.

FIELD OF THE INVENTION BACKGROUND OF THE INVENTION

1. The Field of the Invention

0002 The present invention relates to an improved absorbent article such as a disposable diaper or a sanitary napkin, and more particularly to an absorbent article containing a flat absorbent core, in which the absorbent core is sandwiched between a liquid permeable front sheet and a liquid impermeable back sheet ~~divided into plural portions by means of at least one hollow gap (ditch), and sandwiched between a front surface sheet and a back surface sheet so as to maintain the configuration, which allows the absorbent core to perform its inherent liquid absorbency.~~

BACKGROUND OF THE INVENTION-2. The Related Art

0003 An absorbent article such as a disposable diaper or a sanitary napkin comprises ~~is basically composed of~~ a flat absorbent core having excellent liquid absorbency, which is sandwiched between a liquid permeable front sheet and a liquid impermeable back sheet. In most conventional absorbent articles ~~[[,]]~~ a flat absorbent core is bonded ~~adhered to~~ both front and back ~~surface-sheets~~ with a hot melt adhesive in order to prevent the core ~~part~~ from slipping and shifting ~~being displaced between the sheets.~~

0004 However ~~[[,]]~~ bonding the ~~such an adhesion of an absorbent core and both sheets using a hot melt adhesive is not preferred because it impairs the absorbance of the core preferable as it impairs an absorbency property of an absorbent core to some extent.~~ Especially, when a hot melt adhesive is used to bond the front ~~glue a front surface sheet with the~~ and an absorbent core, ~~there exists a hardened adhesive is present [[on]] the interface between the front surface-sheet and the absorbent core, which reduces the liquid permeability of the front surface-sheet and the absorbency of the absorbent core.~~

0005 ~~As an~~ An absorbent article is known from Unexamined Japanese Utility Model Application Publication No. H1-14707, in which a hot melt adhesive is not applied ~~used on the interface between the [[a]] flat absorbent core and the [[a]] front [[and]] or back surface-sheet and in which the [[a]] flat absorbent core is not leaned or displaced between the front and the back surface-sheet[[,]].~~ In this absorbent article the one in which an absorbent core is divided into parts and the periphery of each part is ~~plural portions, the periphery of each portion fixed firmly~~

to the front sheet and the back ~~surface sheet is known~~ (See Reference 1). In this absorbent article, ~~as all~~ since the periphery of each part of the core ~~the divided portions of the flat absorbent core~~ is surrounded by the joint ~~[[of]]~~ between the front ~~surface sheet~~ and the back ~~surface sheet~~, deviation or slippage can be prevented without gluing the flat absorbent core and the above sheets with a hot melt adhesive. In addition to the above known article ~~[[,]]~~ ~~there is known a~~ conventional absorbent article is known from Unexamined Japanese Patent Application Publication No. H9-51913, ~~having holes on a front surface side in~~ which an absorbent core is arranged ~~intervenes between~~ a liquid pervious front sheet and a liquid impervious back sheet and extends in the longitudinal direction of those sheets~~[[,]]~~ ~~in which a~~ A plurality of holes is provided that are arranged to extend in ~~towards the longitudinal direction and penetrate while piercing the thickness direction of the core~~ the absorbent core, ~~in which the~~ The front and back sheets adhere ~~are adhered along the holes in a non-removable manner so that the front sheet forms grooves~~ ~~ditches~~ extending along the above holes (see Reference 2). Furthermore, as another example, ~~there is known a disposable~~ diaper is known from Unexamined Japanese Patent Application Publication No. 2002-165834 comprising an absorbent article composed of a liquid pervious front sheet, a liquid impervious back sheet, and an absorbent core which is arranged between these sheets. ~~intervenes therebetween in which the~~ The absorbent core is covered with an absorbent diffusible sheet in such a manner that at least one depression or groove ~~ditch~~ is provided on the front sheet side of the absorbent core, which extends in a ~~[[the]]~~ direction from the front sheet to the back sheet so

that a bottom part and a side wall part of the depressions or grooves ~~ditch~~ are covered with the front sheet. In this absorbent article ~~in which~~ the absorbent core comprises absorbent fibers and super absorbent polymer particles, which are arranged ~~said absorbent fibers and super absorbent polymer particles intervene~~ between the front sheet and the back sheet on the bottom part of the depression ~~ditch~~ (see Reference 3).

~~Reference 1: Utility Model application unexamined publication No. H1-14707~~

~~Reference 2: Patent application unexamined publication No. H9-51913~~

~~Reference 3: Patent application unexamined publication No. 2002-165834~~

0006 In the [[a]] conventional absorbent articles ~~article~~ described above [[,]] a groove or depression there is an advantage in that a ~~hole or a ditch~~ functions as a guide for liquid discharged on a front sheet. ~~However surface sheet; however,~~ since an absorbent core adjacent to the groove or depression is under pressure from the front sheet, ~~the a hole or a ditch is pressured with a front surface sheet~~, it causes a disadvantage in that inherent liquid absorbency of the ~~[[an]]~~ absorbent core is disadvantageously decreased in proximity to a hole or a ditch.

0007 That is, in a conventional absorbent article [[,]] a groove ~~hole or a depression~~ ~~ditch~~ is generally formed so that in such a manner that a front surface sheet and a back surface sheet are opposed so as to have a flat absorbent core ~~therebetween in which~~ the front sheet sinks toward ~~[[into]]~~ the back sheet side of the absorbent core to adhere thereto at each place at which the groove or depression ~~that a hole or ditch is provided~~. Thereby, a flat absorbent core adjacent to the groove or depression ~~a hole or a ditch through a front surface~~

sheet-is under ~~[[the]]~~ pressure by the front ~~surface-sheet~~, which inconveniently causes ~~inconvenience in which~~ the inherent absorbent capacity ~~capability~~ of the absorbent core ~~[[is]]~~ to be impaired.

SUMMARY OF THE INVENTION

0008 Thus it is an object of the present ~~Then, the purpose of this invention~~ ~~[[is]]~~ to provide a new absorbent article of the above-described kind, which comprises an absorbent core provided with at least one passage for distributing ~~having a hole or a ditch that functions as a guide for the liquid discharged on~~ ~~[[a]]~~ the liquid permeable front ~~surface-sheet~~, and eliminating the above disadvantage of a conventional absorbent article which has a groove or depression in its front sheet comprising a hole or a ditch.

SUMMARY OF THE INVENTION

0009 An absorbent article of the present invention comprises a rectangular or nearly rectangular shaped flat absorbent core arranged between a liquid permeable front sheet and a liquid impermeable back sheet. The flat absorbent core interposed between the two sheets is divided into not less than two parts by at least one passage through the absorbent article, which traverses a point within a center circle with a radius of 25 mm and whose center coincides with the center of the absorbent article, to the periphery of the absorbent core, and the at least one passage has a depth equal to the thickness of the absorbent core, and is

2 – 6 mm in width, and wherein the front sheet, back sheet, and the absorbent core are formed so that no groove or depression is observable in the front sheet or in the back sheet.

~~An absorbent article of the present invention comprises a rectangular or nearly rectangular shaped flat absorbent core interposed between a liquid pervious front sheet and a liquid impervious back sheet in which the flat absorbent core interposed between said two sheets is divided into not less than two parts by at least one ditch traversing a point within a circle with a radius of 25 mm from its center to the periphery of the flat absorbent core, in which the ditch has the same depth as the thickness of the flat absorbent core, and is 2—6 mm in width while the ditch can be neither directly seen from the front sheet side nor the back sheet side[[.]]~~

0010 In contrast to the prior art absorbent article in which at least one groove or depression can be generally be seen from the front side of the article, the absorbent article of the present invention does not have any observable grooves or depressions in its front side or back side. Instead in the absorbent article according to the invention internal passages through the absorbent core are provided to help distribute liquid passing through the permeable front sheet. Needless to say, both sidewalls of these internal passages are composed of the flat absorbent core, and the top and the bottom of the internal passages are closed by the liquid permeable front sheet and the liquid impermeable back sheet.

~~A hole or a ditch provided at a conventional absorbent article can be generally seen from a front sheet side. On the other hand, as a hole or a ditch provided at an absorbent core of an absorbent article of the present invention can be directly seen neither from a front sheet side nor a back sheet side, such a ditch will be called a hidden ditch in this specification. Needless to say, both sidewalls of this hidden ditch are composed of longitudinal section of a flat absorbent core, and the top and the bottom of the ditch are closed which is sandwiched between a liquid permeable front sheet and a liquid impermeable back sheet[.].~~

0011 In preferred embodiments of the invention at least two intersecting passages are provided in the absorbent article, which divide the absorbent core into at least four separate parts. The at least two intersecting passages intersect at a common point that is within the center circle with the radius of 25 mm, whose center coincides with the center of the absorbent article.

0012 In an especially preferred embodiment of the invention the absorbent core is divided into eight separate parts by three intersecting passages through the absorbent core, which each extend between respective opposite sides of the absorbent article, or between opposite corners, or between opposite peripheral edges of the article. Each of the intersecting passages traverses a central intersection point within the circle with the radius of 25 mm, whose center coincides with the center of the absorbent article. In some embodiments the central intersection point is located at the center of the absorbent article.

BRIEF DESCRIPTION OF THE DRAWINGS

0013 The objects, features and advantages of the invention will now be illustrated in more detail with the aid of the following description of the preferred embodiments, with reference to the accompanying figures in which:

FIG. 1 is a partially plan, partially sectional view showing an example of an absorbent article in which a flat absorbent core is divided into two parts by a hidden-ditch-single central passage extending in the longitudinal direction from one side of the article to the opposite side ~~and imposed between two sheets~~[[.]]; 1[[.]]; 1

FIG. 2 is a sectional view taken [[off]] along the section line II-II [[A-A]] of FIG. 1[[.]]; 1

FIG. 3 is a partially plan, partially sectional view showing an example of an absorbent article in which a flat absorbent core is divided into three parts by two passages ~~hidden-ditches~~ extending in the longitudinal direction ~~and imposed~~ between two sheets[[.]]; 1

FIG. 4 is a sectional view taken [[off]] along the line IV-IV [[A-A]] of FIG. 3[[.]]; 1

FIG. 5 is a partially plan, partially sectional view showing an example of an absorbent article, in which a flat absorbent core is divided into four parts by three through-going passages ~~hidden-ditches~~ extending in the longitudinal direction ~~and imposed between~~ the front and back two sheets[[.]]; 1

FIG. 6 is a sectional view taken [[off]] along the line VI-VI [[A-A]] of FIG. 5[[.]]; 1

FIG. 7 is a partially plan, partially sectional view showing another example of an absorbent article according to the invention, in which a flat absorbent core is

divided by a plurality of through-going intersecting passages ~~hidden ditches~~
extending radially ~~and imposed between~~ the front and back ~~two sheets~~[[.]];

FIG. 8 is a partially plan, partially sectional view of a modified example of the
absorbent article according to the invention shown in FIG.7; and

FIG. 9 is a vertical sectional view of a liquid injection pipe used in a circular
diffusion experiment of saline solution.

DESCRIPTION OF THE PREFERRED EMBODIMENTS ~~EMBODOMENTS~~

0014 In this specification, disposable diapers and sanitary napkins are
collectively called absorbent articles. However, there are many kinds of
absorbent articles, such as with embossing, or with ~~these~~ cuffs and/or gathers
with elastic materials, which are provided in order to improve the fitting properties
and leakage prevention. In addition, various suggestions have been ~~are made~~,
for example, about the form and positioning of closures provided on disposable
diapers[[.]] ~~such as its form or positioning~~. However, such an absorbent article is
basically composed of a rectangular or nearly rectangular shaped flat absorbent
core interposed between a liquid pervious front sheet and a liquid impervious
back sheet regardless of the kind of the article.

0015 In this specification [[.]] a nearly rectangular shaped flat absorbent core
means ~~indicates~~ a flat absorbent core, in which the ~~wherein~~ four corners and/or
crotch portions (coxitic part) of a rectangular shaped flat absorbent core are
trimmed. Therefore, such a nearly rectangular shaped flat absorbent core

includes an oval shaped absorbent core and an absorbent core whose plane form is guitar-shaped or hour glass-shaped.

0016 Any liquid pervious sheet, liquid impervious sheet, or absorbent core used in manufacturing conventional absorbent articles can be employed for a front surface sheet, a back surface sheet, or an absorbent core of an absorbent article according to the present invention.~~[[.]] Namely, an~~ The absorbent core is generally a laminated body or a flat shaped article ~~[[form]]~~ composed of, for example, fluffed wooden pulp, super absorbent polymer, synthetic fibers, or the like. Most of a flat absorbent cores ~~core interposed between the~~ front and back ~~two sheets generally~~ have a uniform ~~has the same~~ thickness. However, the thickness of a central portion can be greater ~~thicker~~ than that of a surrounding portion.

0017 The most distinctive feature of the absorbent article of the present invention is that a rectangular or nearly rectangular shaped flat absorbent core arranged ~~interposed between~~ a front surface sheet and a back surface sheet is divided into not less than two parts by at least one through-going passage ~~ditch~~ traversing one point within a circle with a radius of 25 mm from ~~[[a]]~~ its ~~center of~~ ~~its plane~~ (hereinafter so called as “a center circle”) to the periphery of the flat absorbent-core article. ~~This passage in which the ditch is~~ 2 – 6 mm in width while the passage is hidden so that it ~~ditch is a hidden ditch which~~ can be directly seen neither from the front sheet side nor the back sheet side.

0018 When a gap or passage ~~In a case that a ditch~~ dividing a flat absorbent core into not less than two parts extends in two directions from one point within

the aforementioned center circle, the two directions are typically opposite from each other ~~in an opposite direction of each other~~. However, the directions do not need to be ~~accurately~~ exactly opposite. In other words, each gap or passage ~~ditch~~ dividing ~~[[a]] the flat absorbent core in the thickness direction~~ may, for instance, bend within the center circle. ~~The~~ Therefore, a flat absorbent core of the invention can be divided into a plurality of parts by more than one hidden passage ~~[[ditch]]~~ extending radially from one point P within the center circle C to the periphery E of the absorbent core.

0019 FIGs. 1 - 8 depict various embodiments of absorbent articles of the invention, wherein ~~[[a]] the flat absorbent core is divided or partitioned into a plurality of parts by one or more than two hidden passages and ditches in which the absorbent core is interposed between a liquid permeable pervious-front sheet and a liquid impermeable impervious-back sheet. In the illustrated absorbent articles [[,]] a rectangular shaped absorbent core is embodied utilized as a flat absorbent core that is before being divided or partitioned into parts by gaps or hidden passages ditch(es). However, as explained previously, a nearly rectangular shaped absorbent core of which four corners and/or crotch portions are trimmed can replace the foregoing be replaced with the above absorbent core. When a crotch portion of an absorbent core used in an absorbent article is trimmed so as to deform its plane figure into [[a]] an hourglass shape or a guitar-shape, crotch portions of the corresponding [[a]] front sheet and [[a]] back sheet interposing the core therebetween may be trimmed as well.~~

0020 FIGs. 1 - 8 show examples in which the ~~plane-form~~ of both front sheet and back sheet are also rectangular ~~rectangle~~-similar to that of ~~[[a]]~~ the flat absorbent core ~~for convenience~~. ~~This does not imply~~ ~~Thereby, it does not mean that~~ a front ~~surface-sheet~~ and a back ~~surface-sheet~~ of an actual absorbent article are actually rectangular-rectangle. Incidentally, in disposable diapers, in case that a rectangular or nearly rectangular shaped flat absorbent core is used, the portions of a front sheet and a back sheet which surround the waist and the stomach when applied to the human body are generally extended in a wing shape. Therefore, in case of applying the present invention ~~absorbent article~~ to a disposable diaper, this sort of ~~such a~~ wing-shaped extension is provided on both front sheet and back sheet ~~interposing the flat absorbent core therebetween~~.

0021 In addition, although it is not illustrated, according to the invention, it is possible to apply embossing finish on an absorbent article to improve fitting properties and leakage prevention when applied to the human body. Cuffs and/or gathers composed of elastic materials can be provided as well. Further, in a disposable diaper, various types of closures can be provided for fixing around the waist.

0022 In the drawings, reference numeral 1 denotes a liquid pervious or permeable inner or front sheet, and reference numeral 2 denotes a liquid impervious or impermeable outer or back sheet, while reference numeral 3 denotes a flat absorbent core which is divided by a hidden passage ~~ditch~~ 4 in the thickness direction.

0023 In an absorbent article shown in FIG. 1, a rectangular shaped flat absorbent core is divided by a single passage ditch extending in the longitudinal direction in ~~[[at]]~~ the center and ~~interposed between~~ the front and back ~~two~~ sheets. FIG. 3 shows the absorbent article, ~~wherein~~ in which a rectangular shaped flat absorbent core is divided by two passages ditches arranged parallel to the center line extending in the longitudinal direction so that it is between them ~~as to interpose it therebetween~~. FIG. 5 denotes an absorbent article, in which ~~wherein~~ a rectangular shaped flat absorbent core is divided into four parts by three passages ditches extending in the longitudinal direction ~~at the center~~.

0024 In any absorbent article ~~[[,]]~~ it is preferable for a passage ditch extending in the longitudinal direction to traverse a circle C with a radius of 25 mm (a center circle) whose center is a center of the flat absorbent core, but it is not necessary for each passage ditch to be straight. For instance, in the absorbent core shown in FIG.5, since ~~[[as]]~~ all three passages ditches extending in the longitudinal direction must ~~have to~~ traverse the center circle C, the passage ditch arranged at the center is typically straight while the other two passages ditches arranged on both sides of the center one can have greater distance from ~~[[to]]~~ each other at the edge of ~~as they leave from~~ the center circle. In other words, each of the two passage ditches arranged on both sides of the center passage ditch ~~arranged at the center~~ may be angular, i.e. may bend within the center circle.

0025 FIGs. 7 and 8 denote an absorbent article, in which ~~wherein~~ a rectangular shaped flat absorbent core is divided into a plurality of parts by more than one hidden passage ditch extending radially from one point P within a center circle C

to the periphery E of a flat absorbent core, particularly to an edge or corner of the article. In the [[an]] absorbent article shown in FIG. 7, [[a]] the starting point of the passage ditch-extending radially is at the center of the rectangular shaped absorbent core or article. In this embodiment three passages, each of which extend from either opposite sides or opposite corners of the article, divide the absorbent core into eight separate parts. The embodiment shown in fig. 8 is generally similar to that shown in fig. 7. However, in FIG. 8, [[a]] the starting point P of the passage ditch-extending radially is not at the center of the rectangular shaped flat absorbent core but is within the center circle C, whose center is the center of the absorbent article or core. A circle depicted with a dotted line indicates the aforementioned center circle C with a radius of 25 mm.

0026 In each of the illustrated absorbent articles [[,]] a hidden passage 4 is bounded by ditch 4 comprises sidewalls composed of the parts sections of [[a]] the flat absorbent core and by the in which a liquid pervious front sheet and [[a]] liquid impervious back sheet [[are]] arranged on [[at]] the top and the bottom of the hidden passage ditch. Accordingly, the hidden passage 4 ditch 4 is hollow, and cannot be detected or seen directly from either the front sheet side or back sheet side of the absorbent article.

EXAMPLES

0027 The We will explain the present invention is explained herein below more concretely by showing some examples, as follows; however [[,]] However the examples are not intended to limit the claims appended herein below present invention.

Example 1

0028 With ~~[[an]]~~ air laid equipment ~~[[,]]~~ a five layered absorbent core whose weight percentage of NBSK fiber / thermally bonded fiber / super absorbent polymer is 47.1/4.3/48.6 is prepared.

0029 1st Layer: NBKP fiber 55 g/m^2 + Thermally bonded fiber 5 g/m^2 = 60 g/m^2
2nd Layer: Super absorbent polymer 85 g/m^2 = 85 g/m^2
3rd Layer: NBKP fiber 55 g/m^2 + Thermally bonded fiber 5 g/m^2 = 60 g/m^2
4th Layer: Super absorbent polymer 85 g/m^2 = 85 g/m^2
5th Layer: NBKP fiber 55 g/m^2 + Thermally bonded fiber 5 g/m^2 = 60 g/m^2
Total: 350 g/m^2

0030 A 36 cm X 15 cm flat absorbent core was cut off from the thus obtained absorbent core sheet, divided into two parts by a 6 mm wide gap ditch along the center line in the longitudinal direction. ~~A so as to apply~~ 20 g/m^2 basis weight of Asahikasei Erutasu Aqua was applied onto a front sheet and a 25 μ thick PE film was applied onto a back sheet. The absorbent core, the front sheet, and the back sheet were assembled as shown in FIG. 1 to obtain an absorbent article as core shown in FIG. 1.

Example 2

0031 The ~~same~~ procedure of example ~~Example~~ 1 was repeated to obtain an absorbent ~~core~~ article as shown in FIG. 1, except for changing the width of the passage ditch to 4 mm.

Example 3

0032 The same-procedure of example ~~Example-1~~ was repeated to obtain an absorbent ~~core~~ article as shown in FIG. 1, except for changing the width of the passage ~~ditch~~ to 2 mm.

Example 4

0033 An absorbent article as shown in FIG. 3 was obtained by using the same size flat absorbent core and the same front sheet and back sheet as in example ~~Example-1~~. In this article ~~[[,]]~~ each of the two passages ~~ditches~~ was 6 mm wide ~~[[,]]~~ and a ~~belt-like strip-shaped~~ absorbent core ~~interposed between those~~ passages ~~ditches~~ was 25 mm wide.

Example 5

0034 The same-procedure of example ~~Example-4~~ was repeated to obtain an absorbent ~~core~~ article as shown in FIG. 3, except for changing the width of the passages ~~ditches~~ to 4 mm.

Example 6

0035 The same-procedure of example ~~Example-4~~ was repeated to obtain an absorbent ~~core~~ article as shown in FIG. 3, except for changing the width of the passages ~~ditches~~ to 2 mm. _____

Example 7

0036 An absorbent article shown in FIG. 5 was obtained by using the same size flat absorbent core and the same front sheet and back sheet as in example ~~Example-1~~. In this article ~~[[,]]~~ each of three passages, which extend longitudinally ~~ditches~~ between opposite sides of the flat absorbent core, ~~ditches~~ was 6 mm wide. One

wherein one of those passages ~~ditches~~ was arranged along the central ~~center~~ line of the flat absorbent core in the longitudinal direction. The width of [[,]] ~~and the width of two belt-like~~ each of two strip-like absorbent core parts on opposite sides of the center passage ~~cores interposing the center ditch therebetween~~ was 17 mm, respectively.

Example 8

0037 The same procedure of example ~~Example-7~~ was repeated to obtain an absorbent ~~core~~ article as shown in FIG. 5, except for changing the width of the passages ~~ditches~~ to 4 mm.

Example 9

0038 The same procedure of example ~~Example-7~~ was repeated to obtain an absorbent ~~core~~ article as shown in FIG. 5, except for changing the width of the passages ~~ditches~~ to 2 mm.

Example 10

0039 An absorbent article shown in FIG. 7 was obtained by using the same size flat absorbent core and the same front sheet and back sheet as in example ~~Example-1~~. In this article [[,]] the flat absorbent core was divided into eight parts by passages ~~ditches~~ of 6 mm in width extending radially ~~radically~~ from the center of the flat absorbent core ~~so as to be interposed between a front sheet and a back sheet~~.

Example 11

0040 The same procedure of example ~~Example~~-10 was repeated to obtain an absorbent ~~core~~ article as shown in FIG. 7, except for changing the width of the passages ~~ditches~~ extending radially ~~radically~~ from the center to 4 mm.

Example 12

0041 The same procedure of example ~~Example~~-10 was repeated to obtain an absorbent ~~core~~ article as shown in FIG. 7, except for changing the width of the passages ~~ditches~~ extending radially ~~radically~~ from the center to 2 mm. A liquid absorption rate, a wet back volume, and a diffusion area ratio were each measured for ~~about~~ each absorbent article obtained in examples 1 to 12 according to the following method:

0042 The measured results are shown in Table 1. A comparison example in table 1 reveals the measured results for ~~result of~~ an absorbent article obtained by repeating example ~~Example~~-1, except for not dividing the flat absorbent core into core parts separated by passages within the article ~~with a ditch~~.

Liquid Absorption Rate:

0043 An injection pipe having an internal diameter of 45 mm was vertically connected to the central portion of an acrylic board of 10 cm X 10 cm X 10 mm in thickness, and a measuring apparatus was prepared in which an opening of the same inner diameter as the injection pipe was provided on the connecting part of the acrylic board. The measuring instrument was gently placed approximately on the center of a front sheet of an absorbent article that was placed ~~spread~~ on a plane surface. In this instance ~~[[,]]~~ the acrylic board is in contact with the front

sheet and keeps the injection pipe vertically oriented above it ~~maintains the status in which the injection pipe stands up vertically.~~ Then ~~[[,]]~~ 200 ml of an 0.9 weight percent physiological saline solution ~~of 0.9 weight percentage~~ was poured into the injection pipe from the top so as to reach ~~keep~~ a liquid level of about 50 mm. ~~The~~ and the time (second) for absorbing all the physiological saline solution was measured. Three ~~measuring~~ samples of the saline solution were prepared for each absorbent article. ~~[[,]]~~ ~~[[and]]~~ The times for absorption of each sample by the absorbent article were measured. The average absorption time was obtained from the measured times for each sample ~~time for being absorbed and average thereof was evaluated per sample.~~

Wet Back Amount:

0044 After each of ~~After each sample used for measuring a liquid absorbing rate, i.e., the samples that having absorbed 200 ml of the physiological saline solution~~ was allowed to stand ~~left~~ for 10 minutes, 30 sheets of filter papers of 100 mm X 100 mm (trade name: Advantech No.1140, manufactured by Toyo Filter Paper Inc.) were piled onto the central portion of the sample, and left for 5 minutes while loading 10 kg of weight thereon.~~[[,]]~~ Then ~~[[,]]~~ an increase of weight of the filter papers was measured as the ~~[[web]]~~ wet back amount.

Diffusion Area Ratio:

0045 A small amount of blue dye was added into the 200 ml of physiological saline solution used for measuring a liquid absorption rate as explained above. After the samples absorbed the colored saline solution, the area on the flat absorbent core through which the colored saline solution diffused ~~diffusion area~~

~~of the colored saline for each sample of the flat absorbent core was measured so~~
~~as to evaluate the ratio of the diffusion area to against the whole area of the flat~~
~~absorbent core (36 mm in length by 15 mm in width).~~

0046 It will be appreciated that each absorbent article according to examples
~~Examples~~ 1 to 12 has been greatly improved not only in liquid absorption rate but
also in wet back amount compared with those of the comparison example in
which the ~~wherein an~~ absorbent core is not divided by a hidden passage ditch.

0047 The following experiments were carried out to determine the ~~figure out~~
most effective position for the ~~such a hidden passages ditch to be provided in the~~
absorbent article of the invention on a flat absorbent core.

0048 An absorbent article was prepared by repeating the same procedure of
example ~~Example~~-1 using an identical flat absorbent core, inner surface, and
outer surface, except for not being divided by a gap or passage ditch (same as a
comparison example 1 of table 1). A liquid injection pipe shown in FIG. 9 was
vertically positioned above the center of the absorbent article placed ~~spread~~ on a
plane surface. ~~[[and]]~~ 200 ml of an 0.9 weight percent physiological saline
solution ~~having concentration of 0.9 weight percentage~~ was poured onto the
absorbent article at a flow rate of 14 ml/sec while varying ~~changing~~ the

Table 1 PROPERTIES OF ABSORBENT ARTICLES OF THE INVENTION

Modeled Diaper	Comparison Example	Example 1	Example 2	Example 3	Example 4	Example 5	Example 6
Division of Absorbent	Not divided	2 parts	2 parts	2 parts	3 parts	3 parts	3 parts
Ditch Width (mm)		6	4	2	6	4	2
Absorption Speed (sec)	66	11	15	30	8	10	23
	70	11	15	27	8	10	19
	70	12	15	28	8	10	19
	average	average	average	average	average	average	average
	69	11	15	28	8	10	20
Wet Back Amount	9.3	0.9	0.6	0.8	0.9	0.4	0.5
	9.8	1.1	0.4	1.0	0.7	0.4	0.8
	10.6	1.3	0.5	1.3	0.6	0.6	1.7
	average	average	average	average	average	average	average
	9.9	1.1	0.5	1.4	0.7	0.5	1.3
Diffusion Area Ratio	53.3	72.9	77.9	69.0	80.4	85.0	75.6

Table 1 (con.)

Modeled Diaper	Comparison Example	Example 7	Example 8	Example 9	Example 10	Example 11	Example 12
Division of Absorbent	Not divided	4 parts	4 parts	4 parts	Radially divided	Radially divided	Radially divided
Ditch Width (mm)		6	4	2	6	4	2
Absorption Speed (sec)	66	5	9	17	5	7	12
	70	5	9	19	4	6	12
	70	6	7	19	5	6	14
	average	average	average	average	average	average	average
	69	6	8	18	5	6	13
Wet Back Amount	9.3	0.5	0.3	0.8	0.4	0.5	0.7
	9.8	0.6	0.5	1.0	0.3	0.4	0.8
	10.6	0.6	0.6	1.4	0.5	0.5	0.9
	average	average	average	average	average	average	average
	9.9	0.6	0.5	1.1	0.4	0.5	0.8
Diffusion Area Ratio	53.3	84.8	83.6	75.2	93.8	92.6	84.5

vertical distance from the outlet of the injection pipe to the absorbent article at a flow rate of 14 ml/sec so as to measure the time (second) for the saline solution to spread from the place it dropped to a concentric circle having a predetermined radius.

0049 An internal diameter D of a cylindrical tube composing the upper half of the liquid injection pipe (FIG. 9) was 48 mm, ~~48 mm~~ while a conical tube composing the lower half was designed to have a length of 100 mm in length, an upper internal diameter of 10 mm of upper internal diameter, and an internal diameter at the liquid outlet of 3 mm of internal diameter of the liquid outlet.

Furthermore, in order to maintain the average liquid flow of 14 ml/sec during the experiments, a head H of saline solution in the injection pipe was set at 215 mm before the liquid began to flow.

0050 Table 2 shows the experimental results for the times for the samples of the result in which the time for the saline solutions to spread from the place where they are ~~[[it]]~~ dropped to a concentric circle having a predetermined radius, which were ~~[[was]]~~ measured for a ~~as to the drop of 5 mm and of 25 mm~~.

According to the experimental results ~~result~~ shown in Table 2, the delay of diffusion time was approximately 1.5 second, even when the horizontal distance from the drop position to the plane center of the absorbent core was 25 mm, which is within a tolerance of an absorbent article. In addition, a liquid flow free surface of approximately 50 mm in diameter in which its center was the drop position was observed on the surface of the absorbent core when the liquid flowed out. Accordingly, it is apparent from the experimental results that liquid

absorbency can be greatly improved by locating a hidden passage ditch-for dividing an absorbent core within a circle having a radius of 25 mm from a plane center of an absorbent core when an outlet for liquid is positioned at the plane center of the absorbent core.

Table 2: SPREADING TIMES FOR SALINE SOLUTION ON THE COMPARISON EXAMPLE OF THE ABSORBENT ARTICLE

Radius of Circular Diffusion Circle of Liquid	Horizontal-Distance from Liquid Outlet to Surface of Absorbent Article	
	Diffusion Time with Distance of 5 mm	Diffusion Time with Distance of 25 mm
10 mm	0.7 second	0.8 second
20 mm	1.2 second	1.0 second
30 mm	1.8 second	1.4 second
40 mm	2.7 second	2.1 second
50 mm	3.0 second	3.3 second

0051 In an absorbent article of the invention, since a hidden passage ditch (~~hidden ditch~~) dividing ~~[[a]]~~ the flat absorbent core into a plurality of parts functions as a guide for liquid discharged onto the absorbent article, the liquid discharged approximately to the center of the absorbent article can be quickly guided to the periphery. Moreover, the front or back sheet in the absorbent core, ~~an inner sheet is not pressed into the absorbent core, not even into a section of the core~~ adjacent to the hidden passage, ~~a ditch~~ which is commonly seen because of that in conventional absorbent articles, ~~so that which allows the absorbent core of the absorbent article of the present invention is allowed to utilize its entire absorption capacity perform its essential absorbent capability.~~

0052 According to the present invention ~~[[,]]~~ liquid discharged to the surface can diffuse ~~diffusely osmose~~ into the whole absorbent core with little wet back

amount, which improves the absorbent efficiency of a base material in the
~~comprised in an absorbent core~~. As a result, the amount of the ~~such a base~~
material for absorbing a given ~~the same~~ amount of body fluid can be reduced, so
that the invention provides an absorbent article, such as a resource saving or
waste saving ~~type disposable diaper or sanitary napkin can be provide~~.

REMARKS

The foregoing is a marked-up copy of the specification of originally filed U.S. Patent Application, Ser. No. 10/529,890, which has been filed under M.P.E.P. 608.01 (q) to show that no new matter has been entered in the substitute specification filed in the accompanying amendment.

The substitute specification has been filed to make the corrections in the description in the specification required on pages 2 and 3 of the Office Action. Also a cross-reference to the priority document and standard section headings recommended by the U.S. rules were added. Also corrections have been made in the specification to provide a disclosure in grammatically correct idiomatic English with proper terminology that would be acceptable to one skilled in the art.

Some additional explanations of the changes made are provided in the accompanying amendment.

The substitute specification is warranted to contain no new matter. Note that the position of table 1 in the text above differs from the original application, but this obviously does not constitute "new matter".

Should the Examiner require or consider it advisable that the specification, claims and/or drawing be further amended or corrected in formal respects to put this case in condition for final allowance, then it is requested that such amendments or corrections be carried out by Examiner's Amendment and the

case passed to issue. Alternatively, should the Examiner feel that a personal discussion might be helpful in advancing the case to allowance, he or she is invited to telephone the undersigned at 1-631-549 4700.

In view of the foregoing, favorable allowance is respectfully solicited.

Respectfully submitted,

/ Michael J. Striker /

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